



Missouri Department of Natural Resources Land Reclamation Program



1997 & 1998
Biennial Report

Letter from the Director

The Missouri Department of Natural Resources' (DNR) Land Reclamation Program (LRP) plays an integral part in protecting and preserving Missouri's natural resources. The program is responsible for regulating today's mining industry and for correcting health, safety and environmental problems associated with Missouri's legacy of abandoned mines.

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Front cover photo: Tallgrass prairie blends into native grasses at the Prairie State Park Reclamation Project in Barton County.

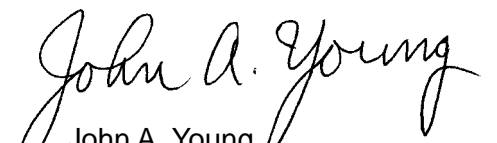
DNR File Photos

When properly reclaimed, these areas can once again be used as crop land or forest cover. Wildlife habitat remains a primary concern of the Land Reclamation Program as wetlands, native grass establishment and reforestation are major components of successful reclamation plans. Reclaiming mine land also protects the environment by preventing toxic or acid mine drainage and soil erosion.

In the future, as coal mining in the state continues to decline due to the use of low sulfur coal from western states, the functions of the Land Reclamation Program will slowly evolve more toward industrial mineral mining that is increasing within the state. The Land Reclamation Program is committed to future changes that may be necessary to assure all mining and reclamation activities are conducted in an environmentally sound manner.

This biennial report provides information and statistical summaries concerning the activities and business of the Land Reclamation Program and its efforts to reclaim mined land during fiscal years 1997 and 1998.

For more information, contact DNR's Land Reclamation Program at 1-800-361-4827 or (573) 751-4041.


John A. Young
Division of Environmental Quality
Director

Introduction

Mining activity in Missouri began as early as the 1740s. Early settlers used the state's reserves of lead, iron and industrial commodities such as limestone, sand and gravel. A new chapter unfolded in the 1840s with the arrival of coal mining in the state. From the date of the first mining until the enactment of Missouri's first strip mine legislation in 1971, nearly 67,000 acres were left unreclaimed by coal-mining operations, and an estimated 40,000 acres were left abandoned through the mining of other commodities. Missourians were left with acid mine drainage, dangerous highwalls, hazardous water bodies, dangerous mine openings, unvegetated and barren spoils, coal waste, soil erosion and stream sedimentation.

To offset the dangerous and unproductive after effects of mining, Missouri enacted legislation in 1971. *Senate Bill 1* also known as *Strip Mine Law*, effective March 28, 1972, regulated coal, tar, sand and barite mining. *House Bill 519*, effective Jan. 1, 1972, regulated limestone, sand, gravel and clay pits. The Land Reclamation Commission was formed to enforce these laws, and the Land Reclamation Program was created to administer them, acting as the commission's staff. Subsequently, the program became part of the Missouri Department of Natural Resources' Division of Environmental Quality.

Through growing national concern over the environmental degradation caused by coal mining, Public Law 95-87 was passed in 1977 by the U.S. Congress. This law, also known as the *Surface Mining Control and Reclamation Act* or SMCRA, dictated specific requirements for the reclamation of coal mined land, and also established state regulatory authorities for the enforcement and monitoring of surface mine reclamation activities. The act also established programs and funding for reclaiming coal mine lands mined prior to May 2, 1977. On May 3, 1978, the Legislature amended Missouri's *Strip Mine Law* establishing Chapter 444.535 RSMo, commonly referred to as the *Interim Program Law*. Requirements of this law include the following:

- A. Topsoil must be removed and replaced to a six-inch depth;
- B. All prime farmland soils must be removed and replaced to 40-inch depth;
- C. All mined land must be reclaimed to an equal or better land-use capability;
- D. Mined land must be backfilled and graded to approximate original contour;
- E. Coal waste and other acid-or toxic-forming material must be covered with a minimum of four feet of non-toxic material; and
- F. A permanent vegetative cover compatible with the premining land use must be established.

On May 17, 1982, the Missouri Legislature passed the *Surface Coal Mining Law* (Chapters 444.800 - 444.970) to match federal standards established in SMCRA. The law made changes to the permitting process and granted the Land Reclamation Commission the authority to administer the abandoned mine land program. Coal companies were now required to submit baseline information on the hydrology, geology, fish, wildlife, soils and cultural resources of the proposed mining area along with a detailed description of the proposed operation and reclamation plan. The most significant change to the reclamation requirements was that prime farmland soils must be removed and replaced to a 48-inch depth. These requirements, known as the *Permanent Program Law*, continue in effect to the present day.

Missouri's *Surface Coal Mining Law* (Chapters 444.800 - 444.970) was also amended in 1993 to address deficiencies in Missouri's bonding provisions to conform with federal requirements.

The *Land Reclamation Act* and the statutes governing tar, sand and barite mining remained essentially unchanged during the evolution of the coal mining standards. In 1990 the passage of *House Bill 1584* amended the *Land Reclamation Act* to encompass all non-coal surface mining activity. This includes limestone, sand, gravel, clay, tar sands and barite mining. Sandstone, granite and traprock quarries also became subject to mining regulations. The revisions require a much more



Native grasses make excellent reclamation plants, and sites such as the Sweet Springs Reclamation Project provide an important wildlife habitat.

thorough description of the method of operation and reclamation. The public was also included in the permitting process for the first time, via a public notice and comment procedure. In addition, the right of anyone affected by a non-compliance at an operation could request a hearing before the Land Reclamation Commission. Time frames requiring operators to complete reclamation in a timely manner were established. Bonding fees

were significantly increased to ensure the state could complete reclamation in the event a permit is revoked. Grading to a traversable topography, as well as replacing 12 inches of topsoil were also required. Following these amendments, rules and regulations were developed that underwent the formal rulemaking process and became effective Feb. 6, 1992.

Highlights for 1997 and 1998

1 The Land Reclamation Program (LRP) continues to make steady progress in addressing Missouri's Abandoned Mine Land (AML) problems. During this two year period, 135 acres of abandoned mine lands were reclaimed. Reclamation was completed to address health and safety problems and included the closure of 51 dangerous openings, consisting of abandoned wells and vertical and horizontal mine openings. Four reclamation projects are featured in this year's report. These include the Otter Creek Project, the Bison Project, the Mindenmines Project and the Sprague Project. These projects exemplify the work that is conducted through Missouri's AML program. More than 40 million dollars of construction work have been completed since implementation of the AML program in 1982.

2 For the two year period, reclamation was completed on 1,076 acres of land utilized for industrial mineral mining. The post mining land uses are agricultural, wildlife habitat, development and water impoundment.

3 In fiscal year 1999, the LRP began administering the AML Emergency Program in Missouri on behalf of the Office of Surface Mining. The LRP is now responsible for investigating all emergency complaints and conducting reclamation work when emergencies are declared. All five of the past emergency situations in Missouri have been related to underground coal mine subsidence.

4 During the two year period, 3,114 acres of reclaimed coal lands were granted Phase III release by the Land Reclamation Commission. As coal mining in the state decreases mining companies have accelerated reclamation. The LRP conducts thorough reviews of these reclaimed lands to insure compliance with performance standards.

5 Initial reclamation work was completed on two large coal bond forfeiture projects. The Amearth/Midwestern Mining Project in Vernon County reclaimed 232 acres including a railroad load-out site, highwalls, coal waste and barren spoils. Acid mine drainage was alleviated at the site by covering acid producing coal waste. The Bill's Coal Project in Vernon County reclaimed 450 acres including highwalls, dangerous embankments and barren spoils. The reclamation of these sites allows these previously mined lands to be productive as recreational areas, wildlife habitat or agricultural lands.

6 The LRP has undergone a significant reorganization in fiscal year 1999 by consolidating the staff into two sections, a mining section and a reclamation section. This has reduced staff in coal permitting and resulted in a more efficient use of funds. The mining section is responsible for mining permits, enforcement actions and bond release functions. The reclamation section administers abandoned mine land activities and provides engineering and technical expertise to the mining section.

Wetlands, such as this one at the Tebo Creek Project in Henry County, treat acid mine drainage and provide wildlife habitat.





MISSOURI DEPARTMENT OF NATURAL RESOURCES

Larry P. Coen, Staff Director
Land Reclamation Commission

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Land Reclamation Mission

To assure beneficial restoration of
mined lands and to protect public
health, safety and the environment
from the adverse effects of mining
within the state of Missouri.

Land Reclamation Program and Administration

Organization

The Land Reclamation Program (LRP) was originally established in the *Omnibus State Reorganization Act* of 1974. This act created the Department of Natural Resources and placed the Land Reclamation Commission (created by Missouri Statutes Chapter 444) under its auspices. The Land Reclamation Commission directs the staffing and operations of the program within the department's Division of Environmental Quality.

The seven-member commission includes three statutory members — the state geologist, the director of the Missouri Department of Conservation and the staff director of the Clean Water Commission. With Senate approval, four public members are selected by the governor. Of these four, only two may be of the same political party. Only one member of the commission may have a direct link with the mining industry.

The LRP consists of the administrative unit that includes the director's office and two distinct sections, the mining section and the reclamation section. A total of 35 full-time staff members are divided between the sections and the director's office. Together, staff members are responsible for regulatory oversight of all surface mining and reclamation of abandoned mine lands in Missouri. Through the years those responsibilities have increased as the statutory laws have increased. The challenges and accomplishments of the LRP staff are described in the following pages.

Coal Mining Activities

Over recent years, Missouri coal production has declined from 4.2 million tons in 1987 to less than 0.6 million tons during 1997 (Table 1). This decline is largely due to industry demands for low-sulfur, western coal needed by power plants in order to meet stricter emission standards required by the federal *Clean Air Act*. Other factors associated with declining coal production in the state are reclamation and transportation costs. Most of Missouri's coal reserves contain relatively high sulfur content, ranging from 2-7 percent by weight. Missouri coal has a relatively high British Thermal Unit (BTU) compared to western coal. In recent years, some power plants have opted to mix Missouri's coal with lower BTU western coal in order to increase energy production without exceeding sulfur emissions.

Over the last two fiscal years, most of the coal removal efforts have been concentrated in a small area in south-western Missouri where coal seems to contain lower levels of sulfur. During this time period, the LRP issued only one new coal mining permit, which covered 224 acres of land in Bates County. At the end of the 1998 fiscal year, only three of the 15 active coal mines were still producing coal. At that time the remainder of the mines were in various stages of reclaiming the land to regulatory standards.

LRP staff closely monitors coal mining operations, including both coal removal and reclamation activities. Declining coal production in no way decreases the responsibilities of the LRP. Monthly inspections of each mine continue to be performed long after the last ton of coal is removed. Revisions to permits and reclamation changes continue to be submitted for review and approval, as operators fine-tune their

post-mining land use plans. Bond release requests increase in number and acreage size as more ground is reclaimed to acceptable standards. In effect, reclamation activities consume a far larger percentage of time and effort than the actual mining of coal itself.

Coal Permitting

Staff members are responsible for reviewing permit revisions and new permit applications. A summary of the permit actions for fiscal year 1997 and fiscal year 1998 are provided in Table 2. LRP staff are professionally trained in specific technical areas and are responsible for reviewing technical plans with respect to their area(s) of expertise. Technical areas that must be reviewed include engineering, blasting, soil science, geology, hydrology, revegetation, land use plans, fish and wildlife protection, cultural and historical resources and reclamation technology. Staff members review all coal permit applications for adequacy and recommend approval or denial. Staff conduct regular evaluations of existing permits and also provide technical assistance to the mining industry and the public.

Missouri Annual Coal Production

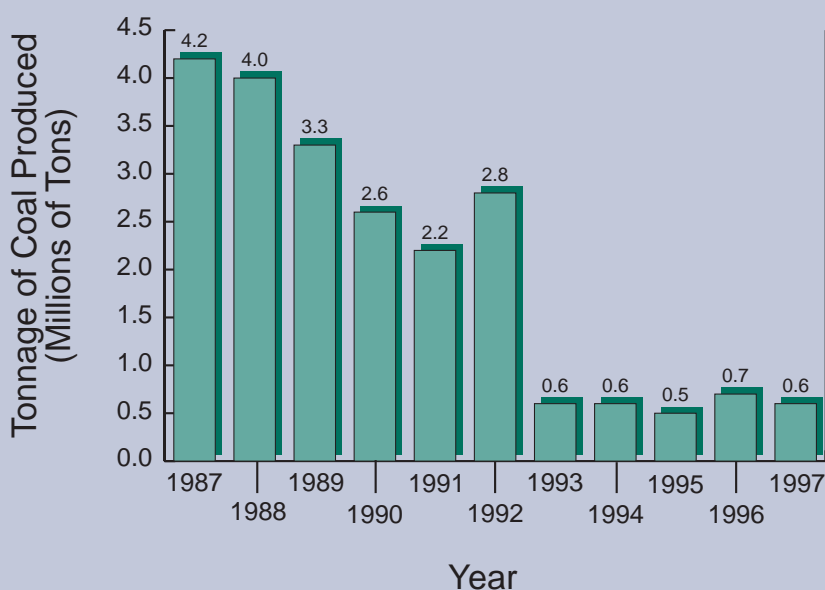


Table 1

Surface Coal Mining Permit Actions for

Fiscal Year
1997 and 1998

	State FY 97	State FY 98
New surface mining permit applications received.	0	1
New surface mining permit applications approved.	1	1
New exploration permit applications received.	0	2
New exploration permit applications approved.	0	1
Permit Amendments received (permit revisions, permit renewals, permit transfers).	102	109
Permit Amendments finalized (approved, withdrawn, denied).	104	111

Table 2

A thorough review of surface coal mining permit applications, permit revisions and other permit-related actions is necessary to ensure that all requirements of the law and regulations are met. This includes determining that all applications, as well as the review process itself, meet all legal and administrative requirements. The permitting requirements for coal mining are extensive, requiring careful evaluation of diverse and comprehensive environmental topics such as soil characteristics, surface and subsurface water quality controls, fish and wildlife information, cultural resources and land use planning. Reviews also focus on specific details such as engineering designs for sedimentation ponds and water diversions, blasting plans and hydrogeologic data to determine the probable hydrological consequences of mining. Other permitting responsibilities include evaluating each applicant's compliance history with past mining activities and ensuring that all public review requirements are fulfilled. Staff members also coordinate with other regulatory agencies to ensure the company proposing to conduct the mining ac-

tivity has obtained other necessary environmental permits.

Reclamation begins immediately after coal is removed from a strip mine pit. Regulations dictate that a pit must be completely backfilled and graded no later than 180 days after coal removal. Topsoil must then be redistributed within an additional 270 days. The area must then be seeded during the first available growing season, with vegetation sufficiently established to control erosion by the end of the second year. Sediment ponds, diversions, explosive storage areas and maintenance pads also are subject to reclamation requirements once they become inactive or are no longer needed as part of the mining operation. Only when these requirements are met can an operator obtain a release of reclamation liabilities.

All coal operators are required to post reclamation bonds. Bonding rates presently are \$2,500 per acre for mined land and \$10,000 per acre for any area used to store or process coal. An operator can submit a written request for release of bond liability if all reclamation requirements for a given area have been met. The area is field checked by an inspector who then reports his conclusions to the Land Reclamation Commission. The commission will then either approve or deny the request.

Bond release is a complex process. Three stages of criteria, termed Phase I, Phase II and Phase III must be met before an operator gains complete release of liability. An area qualifies for Phase I release upon completion of backfilling and grading, topsoiling, drainage control and initial seeding. Phase II release can be granted as soon as a permanent vegetative cover sufficient to control erosion is in place. Phase III release is gained once all terms and conditions of the approved reclamation plan are met, established vegetation is compatible with the post-mine land usage and all vegetative standards for success are met. This process, in the most favorable of circumstances, takes a minimum of seven years to complete.

Reclamation rarely proceeds unhindered. Oversights, improper land management and unforeseen problems all contribute to delays in obtaining bond release. From 1982 to 1995, the number of mined and reclaimed ground that LRP has regulatory responsibility for increased. Since 1995, mining has decreased and companies have com-

pleted reclamation, thereby decreasing the mined disturbed acres under the responsibility of LRP. Table 3 illustrates this fact. Since the inception of the Permanent Program rules and requirements in 1982 through fiscal year 1998, 42,075 acres have been permitted for coal mining activities. Of this total, 19,210 acres, or 45 percent of the land actually was disturbed. Phase I release has been granted on 13,606 of these acres, or 71 percent of the disturbed land. Phase II release has been granted on only 11,270 acres, or 59 percent of all disturbed acreage. Phase III release amounts to 6,745 acres, or 35 percent of all disturbed land mined since 1982.

Combined with many other duties, LRP personnel anticipate that monitoring reclamation progress and evaluating bond release requests will present a challenging work environment for many years to come. As coal production declines, companies will become increasingly compelled to concentrate their efforts toward obtaining bond releases. This trend has been occurring over the past two years (Table 3). Even if all mining ended today, at the present rate of bond release it would take another two to five years for all Phase I to be released, an additional two to five years for all Phase II to be released, and an additional four to seven years for all Phase III to be released.

Coal Mining Inspection

Reclamation activities are as closely monitored as coal removal activities to ensure that required performance standards are met and the reclamation plans approved in the companies' mining permits are followed.

Coal mine inspections are performed monthly. On-site inspections serve three primary functions:

1. Ensure an operation is functioning in a manner consistent with applicable state laws;
2. Ensure an operation is fully complying with the conditions of the permit; and

3. Provide a public record on the status of mining and reclamation at a site.

Two styles of inspections are done, termed a complete and partial. Complete inspections are required once per calendar quarter. They involve complete review of an operator's compliance with all permit conditions and state statutes. As the name implies, partial inspections are a review of an operator's compliance with some of the permit conditions and state statutes. Aerial inspections can be substituted for partial inspections.

The many aspects of a mining operation are scrutinized during an inspection to ensure the following:

1. Mining occurs within the confines of the permit;
2. Topsoil is being salvaged and stockpiled;
3. All runoff from mined areas enters sedimentation ponds;
4. Pits and other areas of mine disturbance are promptly backfilled and graded;
5. Topsoil is replaced; and
6. Vegetation is quickly reestablished to control erosion.

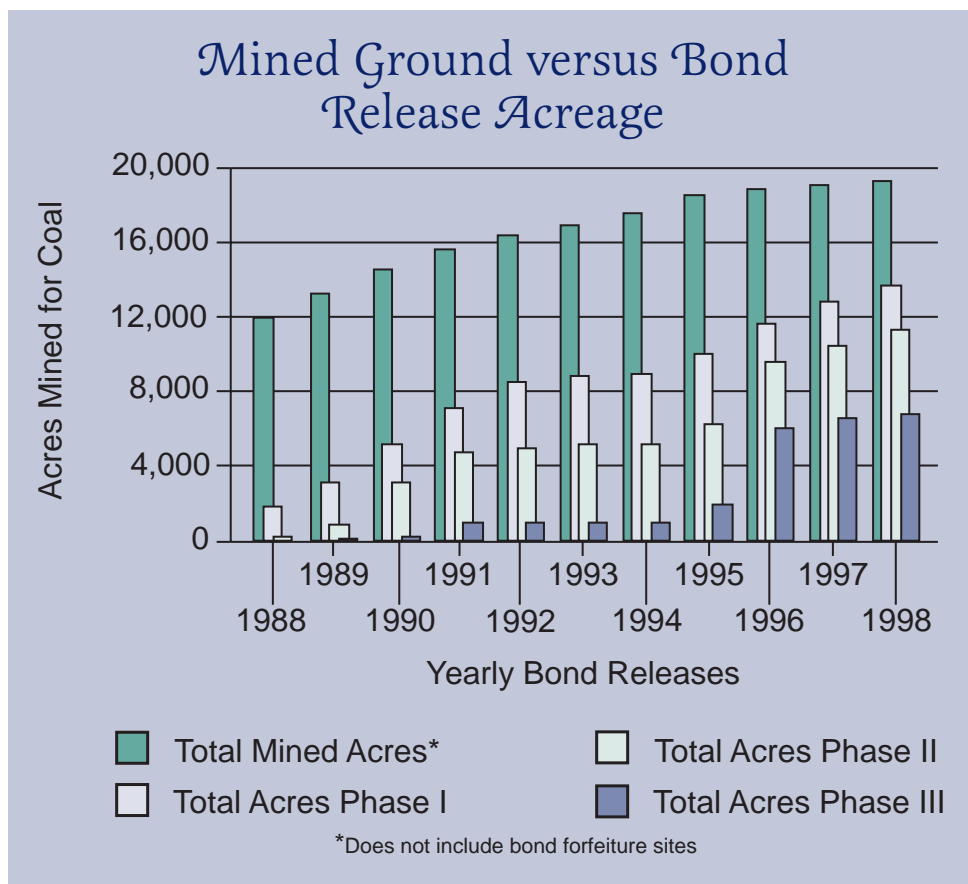


Table 3

Monthly inspections continue long after an operation ceases mining coal. Continued monitoring ensures that reclamation continues in an expedient manner and that all conditions of the reclamation plan are followed. Only when an operator gains approval for a Phase II release (vegetation sufficient to control erosion) does the inspection frequency decrease from monthly to quarterly. This level of release commonly is not reached until several years after mining ceases.

Coal Mining Enforcement

One of the results of doing inspections is issuing enforcement actions. "Notices of Violation" are frequently issued when an operator is out of compliance with the conditions of the permit or with the state statutes. They include both minor and major infractions of the law, and give the operator time to stop the violations. "Cessation orders" are more serious. They are issued when a condition or practice at the mine site constitutes imminent danger to the health and safety of the public or imminent environmental harm to land, water or air resources. It may require the immediate cessation of mining until the problem is corrected. Cessation orders, because of their seriousness, require immediate abatement by the operator. Failure to do so may lead to revocation of the permit. Cessation orders also are issued for failure to abate a notice of violation within the required time frames.

Table 4 displays enforcement actions issued during fiscal year 1997 and fiscal year 1998. The 70 violations issued for failure to follow the approved method of operation include mine-related activities such as topsoil removal, blasting, sediment control, pond construction and observance of buffer zones. Failure to follow the approved method of reclamation includes violations issued for exceeding specified time frames for backfilling and grading pits, covering acid-forming spoil and top soiling and reseedling. Failure to maintain constructed features relates to the deterioration of mine support facilities, such as sedimentation ponds, diversions, haul roads and stockpiles. Administrative violations include failure to submit permit renewals, certificates of insurance, reclamation fees, water monitoring records and blasting notices within the required time frames.

Coal Bond Forfeiture

Each permitted coal company in Missouri is required to provide financial assurances to ensure reclamation of the site after coal removal. Upon completion of reclamation to applicable regulation standards, the coal company receives a release from the Land Reclamation Commission related to reclamation liability and the financial assurances or bonds are released. Should a coal company fail to provide reclamation to applicable regulation standards the bonds are forfeited to the LRP and

1997 – 1998 Inspection and Enforcement Activity

Coal			
Notice of Violation			167
Operational	70		
Reclamation	27		
Maintenance	38		
Administrative	32		
Cessation Orders			45
Imminent Danger	0		
Failure to Abate Notice of Violation	45		
Number of Inspections for 1997 and 1998			711
1997	349		
1998	362		
Number of Acres Released from Bond for 1997 and 1998			
Phase I	3,508		
Phase II	4,605.7		
Phase III	3,114.4		
Industrial Minerals			
Notices of Violation for 1997 and 1998			28
Administrative	13		
Operational	15		
Number of Inspections for 1997 and 1998			590
1997	202		
1998	388		
Acres Released from Bond for 1997 and 1998			1,076
1997	571		
1998	505		

Table 4

these bonds are used to provide reclamation to the site mined by the coal company.

The Coal Mined Land Reclamation Fund is another source of funding dedicated to the reclamation of sites, which were not adequately reclaimed by the coal company. The monies for this fund are attained through a surcharge placed on each ton of coal mined by active coal mining companies in Missouri.

The Land Reclamation Program completes the design work on the forfeited sites. The proposed work is then publicly advertised and bid out through the Office of Administration. Inspection of the construction contract is either conducted by LRP staff or by a private firm. This reclamation removes acidic impoundments, dangerous highwalls, coal refuse material and barren lands to be replaced with small lakes and ponds, vegetated pastures and prime farmland areas. The results will provide wildlife habitats, farming and grazing habitats and recreational settings that will be beneficial and enjoyable to landowners for many years.

Summary of Bond Forfeitures

Between 1981 and 1987 there were eight separate coal mining companies that ceased business operations and failed to provide reclamation to applicable regulatory standards. These companies forfeited bonds on approximately 4,000 acres of land under permit. In April 1998, initial reclamation was completed at Bill's Coal in Vernon County, Mo. This was the final project to be completed related to companies that forfeited bond between 1981 and 1987. It is anticipated that liability release will be granted for all projects forfeited between 1981 and 1987 by the year 2000. The Land Reclamation Program provides maintenance on reclaimed sites until a liability release is granted from the Land Reclamation Commission.

Between 1990 and 1996, an additional seven separate coal mining

companies ceased business operations and failed to provide reclamation to applicable regulation standards. These companies forfeited bonds on approximately 4,300 acres of land under permit. Initial reclamation has been completed for the Amearth Project located in Vernon County, Mo. Of the seven projects forfeited between 1990 and 1996, two have already received complete liability release. The Land Reclamation Program completed the necessary construction work on the two sites prior to liability release. Due to the size of permitted area related to Missouri Mining, over 1,800 acres, and Universal Coal & Energy, over 1,400 acres, complete reclamation and liability release is not anticipated until after the year 2000. These two projects were forfeited in late 1996.

In 1997 there were bond forfeiture proceedings related to two separate coal mining companies with four permitted facilities. The LRP has been negotiating with the bonding companies to provide the necessary reclamation for 2,990 acres of land under permit in lieu of forfeiting bonds.

Coal mine strip pits add diversity for wildlife and provide recreational activities.



Industrial Mineral Mining Activities

Industrial Mineral Permitting

Amendments made in 1990 to the *Land Reclamation Act*, Missouri's industrial minerals mining law, increased the requirements to be met for completing industrial mineral permit and reclamation processes. However, the complexity of permitting and reclamation requirements for industrial minerals still remain far below those required under current coal mining law.

Industrial mineral mining permits are issued for a one year period. The industrial mineral permits must be continually renewed until the Land Reclamation Commission deems all mined land covered by the permit is fully reclaimed. Approximately 470 new or renewed permits were issued in the past two years. Since some permits contain multiple sites, the number of permitted sites is substantially higher as noted in Table 5. In addition to the new and renewed permits, staff spent a considerable amount of time reviewing other permit actions, which include permit transfers, expansions and amendments. Information regarding the number and types of industrial mineral mining sites covered by LRP permits during the past two years is presented in Table 5.

The fees collected from industrial mineral permits are used to conduct the necessary regulatory functions. As of May 1998, these functions include managing both the permitting, inspection and enforcement of industrial mineral permits. Finding a way to complete reviews on approximately 300 permit actions each year while conducting necessary inspections continues to be a challenging goal for the program.

Industrial Mineral Sites Permitted

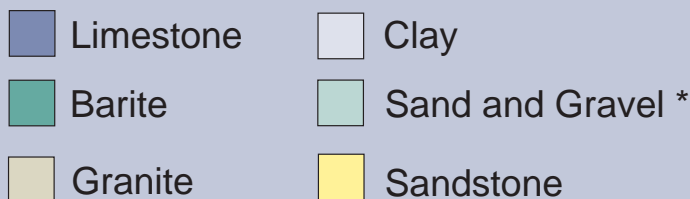
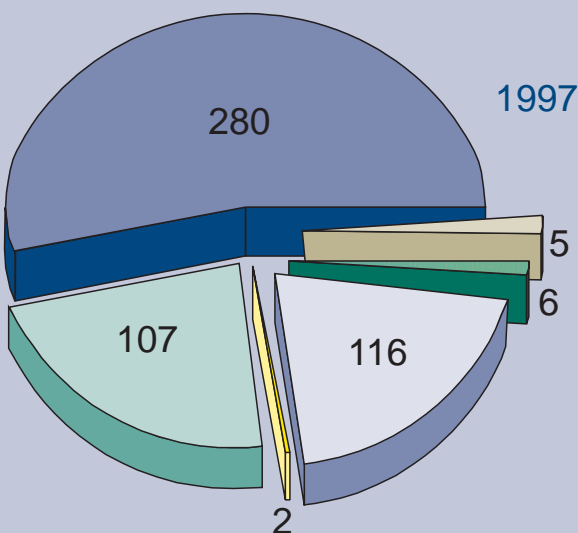
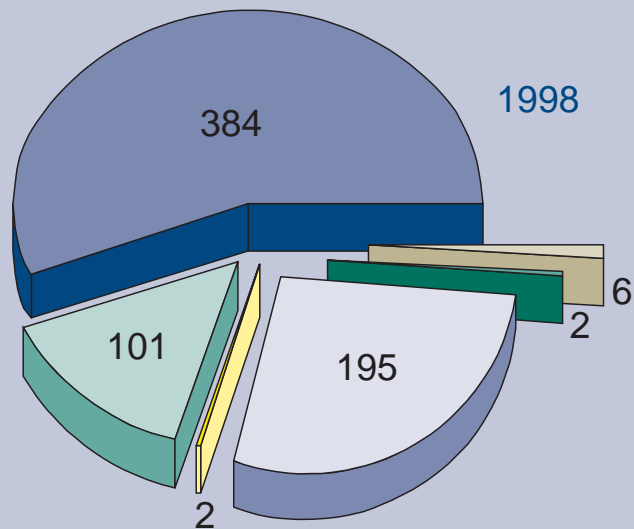


Table 5

The Industrial Minerals (IM) permitting program continues to look for ways to improve its methods of helping the public to understand the IM permitting procedures. Each year, citizens living near proposed mines request four to five public hearings on the issuance of permits. Because of the precise criteria established in the *Land Reclamation Act*, the Land Reclamation Commission had been prohibited from granting any hearings, until the first request for a hearing was approved in May 1998. The hearing, which was conducted to review whether or not a limestone-mining permit should be granted for a location in Lincoln County, occurred mid-fiscal year 1999. The outcome of the permit issuance is still under appeal.

It is probable that requests for hearings, which require a tremendous amount of staff time to address, will become increasingly common as mining companies look to open sites in and close to heavily populated areas. New sites and expansions to existing sites are requested in order to provide building commodities to meet the needs and demands of on-going and new construction. It is likely that sometime in the future, changes may need to be implemented to associated statutes, rules or internal policies in order for the Land Reclamation Program to better respond to the needs of the environment, the unregulated community and the mining companies on industrial mineral-related issues.

Routinely, the concerns brought to the commission are about issues outside the regulatory authority provided to the program through the *Land Reclamation Act*. These issues include concerns about blasting, safety on public roads and the mine's effect on property values. Even so, the commission has encouraged all citizens who have requested hearings under the proper circumstances to personally appear at regularly scheduled public meetings to express their concerns. While the constraints in the laws have prohibited the commission from denying permits, this regular contact with the public has brought an acute awareness to the commission about what is most troubling to the citizens. In return, the public has an opportunity to learn more about the reclamation



requirements under the *Land Reclamation Act*. Continued contact of this sort will certainly help pave the way for the citizens to resolve their concerns about mining.

Clay mine site after reclamation was completed by Alsey Refractory

Industrial Minerals Inspection

The state is divided into six geographic regions with one inspector assigned to each area. Since these inspectors have to conduct other duties related to the permitting of industrial minerals operations and inspections of coal mines they are limited to the amount of industrial minerals inspections they can perform in a given year. The operations range in size from 300+ acre limestone quarries to small one-acre gravel pits.

During fiscal year 1997, 202 inspections were conducted on industrial mineral sites and in fiscal year 1998, 388 inspections were conducted. The 590 inspections conducted during 1997 and 1998 is nearly five times higher than the 122 inspections conducted during 1995 and 1996.

Inspections typically fit into one of three categories: regular inspection, complaint inspection or bond release inspection. Regular inspections are conducted to determine if an operator is in com-

pliance with the approved permit and the applicable performance requirements of the *Land Reclamation Act*. Performance requirements checked by inspectors include timeliness of reclamation, safety barriers, lateral support, erosion and siltation control, grading, topsoil handling and revegetation. Inspectors also evaluate each mine site to ensure that all mining disturbance is confined to the permitted and bonded area and that the approved post-mining land uses are being established. Complaint inspections are conducted after the program receives notification from the public that an industrial minerals operation may be in violation of the *Land Reclamation Act*. Complaints filed by citizens may involve blasting, noise, truck traffic, water pollution, erosion or siltation. Following an investigation, the inspector and operator are often successful in resolving a citizen's complaint in a timely manner. However, many public complaints related to mining operations, such as blasting and noise, are not regulated by the LRP and are referred to the appropriate regulatory authority.

Limestone quarry during mining operation.

Bond release inspections are conducted at the operator's request when reclamation has been completed. The focus of the bond release inspec-

tion is to determine if the mine site has been reclaimed in accordance with the reclamation plan. The inspector must also evaluate if the operator has established the designated post-mining land use(s). Post mining land uses may be designated as wildlife habitat, agricultural, development or water impoundment. When mined land is properly reclaimed, a recommendation for bond release is made to the Land Reclamation Commission. If approved, the reclamation bond is released back to the operator. The Commission approved the release of 571 acres of reclaimed mine land in 1997 and 505 acres in 1998.

Industrial Minerals Enforcement

The enforcement powers of the Land Reclamation Commission were enhanced in two significant ways by revisions made in 1990 to the *Land Reclamation Act*. The commission may impose administrative penalties when notices of violation are issued and they have the option of referring civil actions to the Cole County Court rather than the county in which the violation occurred. These revisions have resulted in more prompt and vigorous action by the violators to eliminate violations.

Often violations observed during an inspection are eliminated through the use of conference, conciliation and persuasion. The process encourages the operator to correct a non-compliance through voluntary action and is used normally in cases of relatively minor non-compliance. If attempts to correct a violation through conference, conciliation and persuasion are not successful, a notice of violation is issued to the operator.

Table 4, on page 9, displays the notices of violation issued to industrial mineral operators during 1997 and 1998. Eight violations were issued during 1995 and 1996, 28 were issued during 1997 and 1998. This increase in enforcement activity may be attributed to the significant increase in the number of inspections conducted. Of the 28 notices issued during 1997 and 1998, 13 were administrative in nature and 15 were opera-



tional violations of the performance requirements. Administrative violations often involve mining without a valid permit or mining outside of the permitted area. Notices of violations related to performance requirements include the failure to control off-site sedimentation, erosion, improper topsoil handling and the failure to meet safety barrier requirements.

An increased number of site inspections at industrial mineral operations carry the potential for an increase in enforcement activity during the coming year. Industrial mineral operators who are not thoroughly familiar with the requirements of the *Land Reclamation Act* risk inadvertent non-compliance. Only through close coordination with Land Reclamation Program personnel are potential enforcement actions avoided or minimized.

In-Stream Sand and Gravel Mining

One of the most prevalent types of mining in Missouri, as far as the number of sites, is the “in-stream” removal of sand and gravel. Numerous operators across the entire state use sand and gravel deposits (called gravel or sand “bars”) as a source of aggregate material. During the past two fiscal years, the responsibility for overseeing the permitting and mining of this resource has been shared by DNR’s Land Reclamation Program and the U.S. Army Corps of Engineers (Corps).

Due to a change in Section 404 of the federal *Clean Water Act* in September 1993, the Corps gained authority over the regulation of the “excavation” of materials from waters of the United States. Almost all streams in Missouri fall under this authority. The 1993 change in the *Clean Water Act* was commonly referred to as the “Excavation Rule” or the “Tulloch Rule”, after a developer named Tulloch whose excavation of several hundred acres of wetlands inspired a lawsuit which resulted in the addition of the rule. The Corps already had, and continues to retain authority over the addition of any fill material to those waters.



The *Land Reclamation Act* and the associated rules include provisions that allow an operator to be exempt from permitting through LRP if the operator has obtained a permit from another government agency whose permitting requirements are at least as strict as those required by LRP. In most cases, the 404 permits that were issued to in-stream sand and gravel miners by the Corps of Engineers were clearly more stringent than the permits required by LRP. As a result, the majority of these operators were “exempted” from having to obtain a mining permit from the LRP during the 1997 and 1998 fiscal years. However, in June 1998, the Corps of Engineers lost a lawsuit levied by the American Mining Congress, which resulted in the nullification of the so-called Excavation Rule. This ruling resulted in voiding many of the Corps in-stream permits therefore, LRP is now working in close communication with the Corps to permit mining operations that were formerly exempted by LRP permitting requirements. However, some in-stream sand and gravel operations, due to their method of removing the aggregate material, still require a Corps permit.

Martin Marietta completed reclamation at this quarry site in Andrew County.



Abandoned mining impoundments can provide recreational opportunities but when highwalls and mining impoundments were left adjacent to roads they may pose a hazard to motorists.

Industrial Mineral Bond Forfeiture

The *Land Reclamation Act*, which went into effect Jan. 1, 1972, initially permitted and regulated the mining of limestone, clay, barite, tar sands, sand and gravel in Missouri. As part of that regulation, the companies and individuals so engaged were obligated to put up a reclamation performance bond in the amount of \$500 per acre for every permitted acre. Should the individual or company fail to perform the required reclamation the bonds were then forfeited and the state was to complete the reclamation.

The bonding amount was subsequently found to be inadequate to cover reclamation costs, as well as other inadequacies in the *Act*, and the *Act* was amended effective Aug. 28, 1990. The amendment added additional minerals to those already

regulated and increased the reclamation bonding to a minimum bond of \$8,000 for up to eight acres and \$500 for every acre permitted thereafter.

Between 1972 and 1998, 29 sites operated by 17 different companies became bond forfeiture sites and the responsibility of LRP to properly reclaim. To date, of those 29, all but seven have been reclaimed, or repermited, bonded and reclamation liability assumed by other companies or individuals. Ten industrial mineral sites were granted reclamation liability releases during 1997 and 1998 by the Land Reclamation Commission. Of those 10 sites, five sites totaling 11 acres were repermited by other companies that assumed the existing reclamation liabilities. The other sites, totaling 23 acres were reclaimed as pasture, ponds and wildlife habitat.

Metallic Mineral Activities

Metallic Minerals Permitting

In 1991, DNR issued 11 permits to operators under the *Metallic Minerals Waste Management Act* (MMWMA). During 1997 and 1998, LRP initiated a five year review of metallic minerals waste management permits.

The permit applications consist of financial assurance information, detailed waste management area closure and inspection-maintenance plans. The plans establish and explain the technical steps proposed to accomplish and maintain closure after mining and waste disposal is completed. Issues addressed in the plans include the following:

1. the design and construction of waste control structures and tailings dams;
2. the characterization of waste products;
3. the methods for control and protection of surface water;
4. the methods for protection of groundwater and aquifers;
5. the geology and seismicity of the area;
6. the potential of subsidence;
7. the reuse and off-site removal of wastes; and
8. the surface reclamation of waste management areas.

During the current five-year review, LRP is coordinating with the other Missouri Department of Natural Resources (DNR) Programs involved with the metallic minerals waste management areas. These agencies include the Division of Environmental Quality's Air Pollution Control Program, Water Pollution Control Program, Solid Waste Management Program, Public Drinking Water Program, Hazardous Waste Program and the Division of Geology and Land Survey. The coordination process will allow the other programs to review and comment on the technical aspects of the plans so that all DNR issues may be incorporated into the permit.

Metallic Minerals Inspection

Inspections are performed semi-annually on the 11 metallic minerals waste management permit areas within Missouri. During the course of these inspections, all aspects of each company's permits are evaluated. The main focus of these inspections is to assess the company's compliance with virtually every environmental law that is administered by the Missouri Department of Natural Resources.

LRP is entrusted as the coordinating agency within the department for each active metallic mineral producer currently operating in Missouri. It is the program's responsibility to act as the liaison for the other programs within the department and each metal producer to ensure continuing compliance with all applicable state environmental laws.

Actual on-the-ground reclamation does not begin at these sites until mineral production is stopped and mine closure begins. Only one lead producer in Missouri is in closure at the present time. Cominco American's Magmont Mine ceased production in 1995 and began the actual rec-



*Lead tailings
reclamation at
Cominco
America's
Magmont Mine
in Iron County*

lamation of the surface effects of almost 30 years of lead mining and processing.

The first phase of the Cominco reclamation project involves covering the 300-acre tailings impoundment with clay material from adjacent land. During 1997 and 1998, the company finalized the covering and grading of the tailings area and continued to monitor surface and groundwater in the region. With the dual objective of erosion control and the establishment of wildlife habitat, the company has conducted revegetation efforts on approximately 200 acres. During the closure phase, Cominco has planted a diverse mix of grasses, legumes, shrubs and over 60,000 native trees. With technical assistance from the Missouri Department of Conservation, the company has designed and implemented a land use plan that will benefit na-

tive wildlife including deer, turkey and bobwhite quail.

Metallic Minerals Enforcement

To date, the enforcement of the provisions of the MMWMA has not been necessary by LRP. Enforcement under this law is significantly different from enforcement under either the coal or industrial minerals units of the program. If it should become necessary to issue a citation to any of the metal producers, the authority to do so rests solely with the director of the Missouri Department of Natural Resources. Enforcement is only authorized by law after attempts to eliminate the violation through conference, conciliation and persuasion have been exercised and exhausted.

Abandoned Mine Land Activities

Since the early 1840s, coal mining has at times been a major industry in the north central and southwest portions of Missouri. Up to six million tons of coal were mined annually in the first three decades of the 20th century. Because mining companies gave little or no thought to the post-mining value of the land, some 67,000 acres of land were left abandoned prior to the passage of Missouri's first strip-mine legislation in 1971. Although nature has adequately reclaimed much of this land over the years, more than 10,000 acres have been identified that require reclamation work to correct a wide range of public health, safety and environmental problems. These problems include safety hazards such as steep and unstable highwalls and embankments, open mine shafts, abandoned mining equipment and facilities, dangerous impoundments and unsanitary trash dumps. Acid mine drainage and sedimentation from exposed coal waste and mine spoils also pollute and clog streams. Ground subsidence, caused when old underground mines collapse, may damage overlying buildings.

Abandoned mine land (AML) reclamation took a giant step forward when the U.S. Congress enacted Public Law 95-87, the *Surface Mining Control and Reclamation Act* of 1977 (SMCRA). The *Act* outlined specific requirements for the reclamation of lands mined after May 2, 1977, and established programs and funding for reclaiming abandoned mine lands. In January 1982, Missouri received approval from the fed-

eral Office of Surface Mining to operate the AML program and conduct reclamation work in the state.

AML Inventory and Reclamation Project Ranking and Selection

Public Law 95-87 requires that the highest priority abandoned coal mine sites be reclaimed before problems created by mining other commodities are addressed. Therefore, Missouri presently only reclaims abandoned coal mining problems. The information pertaining to Missouri's abandoned coal mine lands is contained in the AML Inventory. This database currently contains 215 coal mine problem sites and is continually updated as existing site conditions change or new sites are identified. The order in which abandoned coal mine land is reclaimed is initially determined by classifying the problem sites into three broad priority categories. Priority I and II problem sites are reclaimed first since they pose a threat to the public health and safety. Priority III problem sites adversely affect the environment and may be addressed after all Priority I and II sites are reclaimed. On an annual basis, the unfunded Priority I and II problem sites are ranked and selected for future reclama-

Mine spoil sediments have clogged an intermittent stream and is killing vegetation on unmined land near the Ellis coal problem area. The Ellis Coal project is scheduled to be designed in the Summer of 1999.



AML Grant Funding

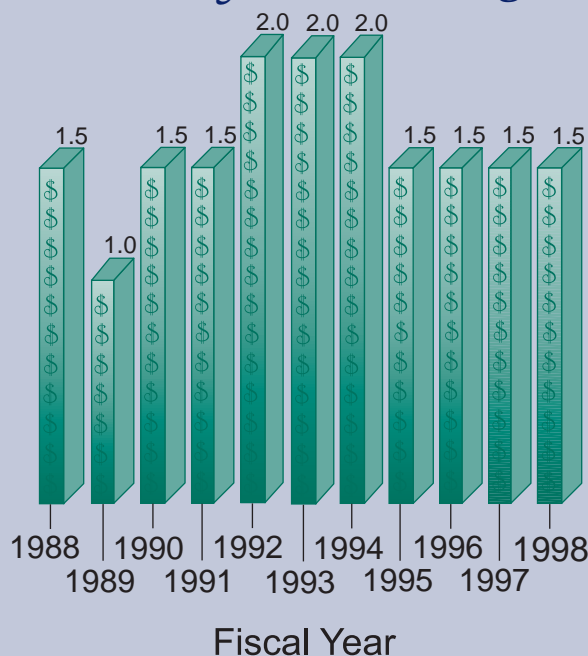


Table 6

AML Funding Summary (through 6/30/98)

Total Administrative Grants	\$7,225,736
Total Construction Grants	\$30,357,251
Total Consolidated AML Grants	\$12,500,667
Total Future Set-Aside Grants	\$35,394
Total Cooperative Agreements	\$8,147,494
Fiscal Year 1983 Rural Abandoned Mine Program (RAMP) Grant	\$812,371
Subtotal for Missouri AML State and Federal Projects	\$59,078,913
Federal Emergency Projects	\$16,800
Federal Contracts	\$28,314
RAMP Projects by Soil Conservation Service	\$926,543
Subtotal for Other Federal Projects	\$971,657
Total All Activities	\$60,050,570

Table 7

tion work according to the severity of existing problems. To date, an estimated \$78.5 million in Priority I and II and \$66.8 million in Priority III AML problems have been inventoried in Missouri. Of these totals, \$38.4 million in Priority I and II and \$63.3 million in Priority III AML problems remain unfunded.

AML Reclamation Funding

The AML activities of LRP are totally funded by the federal AML reclamation fund. All of the money in the fund is collected from active coal mining companies through fees charged on the tonnage of coal mined since the passage of SMCRA. The fund is distributed to eligible states and American Indian tribes by the federal Office of Surface Mining Reclamation and Enforcement within the Department of the Interior. To date, Missouri has received \$60 million in AML grants and cooperative agreements from the fund to conduct reclamation work in Missouri. However, because of steadily declining coal production since the late 1980s, Missouri and other Midwestern states have received decreasing allocations. In 1987, the U.S. Congress established an annual minimum base funding level in the amount of \$2 million to allow states with significant abandoned coal mine problems but limited coal production to continue their AML programs. However, the \$2 million minimum base amount has been reduced to \$1.5 million in the federal appropriations process (Tables 6 and 7). Missouri has an excellent record for obligating the funds received. Through state fiscal year 1998, 97 percent of all grants received have been contractually obligated for the completion of reclamation projects.

AML Reclamation Accomplishments

LRP has made much progress toward reclaiming Missouri's most severe abandoned coal mine problems. Eighty reclamation projects, totaling 3,767 acres have been completed and a 26-acre project is currently under construction. Engineering designs are being prepared for seven additional reclamation projects covering 108 acres. These formerly barren and acidic wastelands are being reclaimed to productive uses such as pasture, for-

age and wildlife habitats. Tables 8 and 9 provide details as to the types and numbers of problems reclaimed. Despite these notable accomplishments, an additional 121 abandoned coal mine problem sites, covering more than 7,700 acres, remain to be reclaimed as grant funding becomes available.

AML Feature Projects Bison Project

The Bison project is located in Barton County, seven miles southwest of Liberal and two miles north of Mindenmines. Construction activities were initiated in 1995 and were completed in 1996. Reclamation activities included grading dangerous piles and embankments, backfilling highwalls, closing two vertical mine openings and reestablishing creek drainage to mitigate a flooding problem caused by past mining. Six

acidic impoundments and a trash dump were also reclaimed. Acid mine drainage and acidic sediments were adversely affecting native plant communities in Prairie State Park. The total project acreage was 120 acres over eight sites. Ninety acres were reclaimed within Prairie State Park boundaries. Warm-season, native grasses and forbs were planted on all 120 acres. Native prairie seed was collected within Prairie State Park and planted on all 90 acres within Park boundaries. This work has greatly improved grassland wildlife habitat and protected endangered native plant

AML Reclamation Accomplishments Through 6/30/98

AML Problems:	Reclaimed	Under Const.	Under Design	Total
AML Projects(#)	80	1	7	88
Mine Openings (#)	138	6	11	155
Highwall (ft.)	79,171	300	4,300	83,771
Hazardous Facilities (#)	31	2	1	34
Subsidence (ac.)	3	0	0	3
Surface Burning (ac.)	19	0	0	19
Underground Mine Fire (ac.)	2	0	0	2
Unsanitary Trash Dumps (ac.)	73	0	0	73
Dangerous Piles/ Embankments (ac.)	540	1	4	545
Clogged Streams (mi.)	10.6	0.2	0.0	10.8
Clogged Stream Lands (ac.)	1,492	0	21	1,513
Polluted Water: Human Consumption, Agricultural or Industrial (#)	47	1	1	49
Hazardous Impoundments (#)	16	0	0	16
Polluted Impoundments (ac.)	89	0	1	90
Spoil (ac.)	1,310	13	82	1,405
Gob (ac.)	140	11	0	152
Slurry (ac.)	69	0	0	69
Total AML Acreage	3,737	26	108	3,871

Table 8

communities in the area. The Bison project has begun the long and difficult process of prairie restoration.

The U.S. Army Corps of Engineers determined there were seven acres of wetlands that would be lost as a result of the work and would require mitigation. Biological diversity of these wetlands were limited due to their predominately acidic and metal-rich waters. Seepage from these wetlands was affecting native prairie plant communities. Landowner and site constraints associated with the Bi-

AML Reclamation Accomplishments

7/1/96 through 6/30/98

FINAL DESIGN COMPLETIONS:

Project Name	County	Acres	AML Problems *
Fulton	Callaway	26	PWAI, DH, DPE, 6 VOs
Reese Subsidence	St. Louis, City	1	Grouting under 2 homes
Sprague	Bates	18	DH, SA
Moore's Branch	Vernon	26	DPE, GO, SA
Bill's Coal Co.	Vernon	35	DPE, DH, SA, IRW
Harmony School Shaft	Bates	1	5 VOs
Childress Subsidence	St. Louis, City	1	Grouting under 1 home
Mindenmines(Phase II)	Barton	1	37 VOs
Silver Fork Portals	Boone	1	3 Ps
Bear Creek	Henry	18	DH, SA
5573 Mardel Subsidence	St. Louis, City	1	Grouting under 1 home
1472 Gregg Subsidence	St. Louis, City	1	Grouting under 1 home
Total Acres		110	

CONSTRUCTION CONTRACT AWARDS:

Project Name	County	Acres	AML Problems *
Fulton	Callaway	26	PWAI, DH, DPE, 6 VOs
Reese Subsidence	St. Louis, City	1	Grouting under 2 homes
Sprague	Bates	18	DH, SA
Moore's Branch	Vernon	26	DPE, GO, SA
Bill's Coal Co.	Vernon	35	DPE, DH, SA, IRW
Harmony School Shafts	Bates	1	5 VOs
Childress Subsidence	St. Louis, City	1	Grouting under 1 home
Mindenmines(Phase II)	Barton	1	37 VOs
Silver Fork Portals	Boone	1	3 Ps
Total Acres		110	

CONSTRUCTION CONTRACT COMPLETIONS:

Project Name	County	Acres	AML Problems *
Frost/Calfee Shafts	Randolph	1	6 VOs
Otter Creek	St. Clair	50	PWAI, DH, SA, IRW
Reese Subsidence	St. Louis, City	1	Grouting under 2 homes
Sprague	Bates	18	DH, SA
Moore's Branch	Vernon	26	DPE, GO, SA
Bill's Coal Co.	Vernon	35	DPE, DH, SA, IRW
Harmony School Shafts	Bates	1	5 VOs
Childress Subsidence	St. Louis, City	1	Grouting under 1 home
Mindenmines(Phase II)	Barton	1	37 VOs
Silver Fork Portals	Boone	1	3 Ps
Total Acres		135	

* Key to AML problem abbreviations:

VO - vertical opening

P - portal

DH - dangerous highwall

DPE - dangerous piles or embankments

CS - clogged stream conditions

WA - water problems (acid mine drainage and sedimentation)

IRW - industrial or residential waste dump

SA - spoil area

SL - slurry (coal waste)

GO - gob (coal waste)

PWAI - polluted water agricultural/industrial

son project, compelled Missouri AML to mitigate the loss of these wetlands at another location on Missouri Department of Conservation lands, west of Rich Hill in Bates County. This wetland mitigation project is known as the Sprague Reclamation Project and is described below. The total cost of the Bison project was \$821,195.

Sprague Project

The Sprague Project site is located in Bates County approximately six miles west of State Highway 71 at Rich Hill, Mo. Missouri AML chose this location because an eroding highwall threatened the public safety along Highway A and wetlands could be constructed on land owned and managed by the Missouri Department of Conservation within the Peabody Conservation Area.

Construction was completed in spring 1998. A dangerous mining highwall along Highway A was backfilled and an access road with limited highway visibility was moved to protect public safety.

The U.S. Army Corps of Engineers delineated approximately 1.6 acres of wetlands within the proposed project area. As a result, a total of 8.8 acres of wetlands were constructed to mitigate losses at both the Sprague and Bison projects. Water levels within the wetland can be manipulated by wildlife managers to maximize benefits to wildlife. An additional 18-acres of abandoned mine lands were reclaimed at the Sprague project. Seeding was completed in spring 1998. Warm-season, native grasses and forbs were planted to promote prairie wildlife habitat. Native trees will be planted along the shorelines. Public fishing access to a strip pit was improved during the work. Total cost for the Sprague project was \$297,104.

Otter Creek Project

The Otter Creek Project site is located in St. Clair County approximately 3.5 miles north of Lowry City and 12.8 miles south of Clinton, Mo. The site includes a total of 33 acres of mine spoil and 17



acres of acid impoundments. Acid mine drainage from the mine area degraded a tributary of Big Otter Creek and caused numerous fishkills in the stream as far away as Harry S. Truman Reservoir, approximately three miles north of the project site. Missouri Department of Conservation records indicated that the latest mine-related fishkill in Big Otter Creek occurred in 1987. Additional fishkills were likely prior to reclamation due to the unstable conditions of the mine area and the large volume of acid mine drainage exiting the site. Several adjacent landowners expressed concern that the poor water quality was affecting their livestock business.

A 25-acre lake was constructed to provide cover material and dilution water to mitigate acid mine drainage. The acidic, sandstone overburden and the over-sized boulders limited the use of mine spoil as a plant-growing medium at Otter Creek. The soil was removed from a 10-acre portion of the lake area to minimize the loss of prime farmland that surrounds the project. The deep, alluvial soil has proven to be an excellent ground cover material for project revegetation. The freshwater lake provides a summertime source of dilution water to mitigate acid mine drainage. A small dilu-

The Bison Reclamation Project restored native grasses to 80-year-old mine lands at Prairie State Park.



Missouri abandoned mine lands can be very productive forests. Black walnut, pecan, red and white oak can achieve excellent growth rates.

tion pond was constructed to collect the numerous acid seeps and mix the mine drainage with the lake's dilution water. Fishing and recreation are added benefits for landowners at Otter Creek.

The total project size was 75 acres. All earthwork activities were completed in spring 1998. Forty acres of the project site were seeded with warm-season, native grasses and forbs. Thirty-five acres were seeded to cool-season grasses at the request of the landowner. Trees will be planted along riparian corridors and shorelines to improve wildlife habitat. Total reclamation cost for the Otter Creek project was \$955,964.

Mindenmines Project

The Mindenmines Project is located in western Barton County within the incorporated limits of

Mindenmines (population 300). Forty-nine abandoned water wells, or cisterns, related to past coal mining were backfilled under the reclamation project. LRP initiated investigation and design activities during the fall of 1994, after 96 abandoned wells had been located and assessed for safeness by state and local officials. The local inventory effort was undertaken in hope that state or federal funding could be obtained to assist local residents in eliminating these dangerous openings.

LRP subsequently determined that 64 of the wells were directly related to past coal mining facilities and therefore were eligible to be closed using AML funds. Mindenmines was first established exclusively as an underground coal mining camp in the late 1800s. At the peak of mining in the early 1900s, the population of Mindenmines was nearly 4,000 and there were three active underground mines within the incorporated limits. LRP concluded that the AML eligible abandoned wells were built to serve both coal mining operations and miner housing. Many of the miners' homes and related structures are no longer standing, leaving a vacant lot or a temporary structure, such as a mobile home, in its place.

In June 1995, 12 of the AML eligible wells, located primarily in vacant lots, were successfully closed by LRP. The construction contract was awarded to the low bidder, O. T. Construction of Fort Scott, KS, in the amount of \$9,136.25. The final construction cost was \$7,841.75. These 12 wells were closed with the understanding that when a planned wastewater treatment facility was completed in Mindenmines, a second contract would be initiated to close more eligible wells. In October 1997, following the completion of the wastewater treatment system, LRP closed 37 additional wells. The construction contract was awarded to the low bidder, Curtis Manahan of Girard, KS, in the amount of \$12,560. The final construction cost was \$12,720. The 15 eligible wells that remain unreclaimed, along with the 32 ineligible wells, are still in use by the landowners. The landowners have placed sound, sturdy covers over these well openings.

Missouri's AML Emergency Program

In March 1998, LRP submitted a proposed amendment to its state AML reclamation plan that allowed Missouri to assume the administration of the AML emergency program on behalf of Office of Surface Mining (OSM). The amendment was approved by OSM in June 1998. Administrative procedures and guidelines for conducting the emergency program were completed in September 1998. Consequently, beginning with fiscal year 1999, the LRP is responsible for investigating all emergency complaints in Missouri and conducting reclamation work when emergencies have been declared.

Section 410 of SMCRA authorizes OSM to use funds under the AML reclamation program to abate or control emergency situations in which adverse effects of past coal mining pose an immediate danger to the public health, safety or general welfare. Since 1982, OSM has invited states to amend their AML reclamation plans for the purpose of undertaking reclamation programs on behalf of OSM. States would first have to demonstrate that they have the statutory authority to undertake emergencies, the technical capability to design and supervise the emergency work and the administrative mechanisms to quickly respond to emergencies either directly or through contractors. Missouri elected to take over the emergency program only after conducting several non-emergency projects similar in scope of work to emergency abatement, i.e., subsidence abatement and mine shaft closures. The LRP staff now has the necessary expertise and experience to design emergency projects in-house, thus avoiding the time-consuming process of contracting with outside engineering firms. Recent changes in the State's procurement procedures for under \$25,000 construction contracts have also made it possible for LRP to meet the rapid response time required for emergency abatement.

All five of Missouri's past emergency situations have been related to underground mine subsidence. OSM has conducted six AML emergency investigations in Missouri during the past two years. None of these situations were declared to be emer-



Grout is pumped into the drill holes to fill up mine voids and stabilize the ground under the house.

Underground coal mining leaves open spaces called voids that can collapse and result in surface subsidence. Drilling is used to determine the location of the mine voids under this house and the structural stability of the rocks above the mine voids.

Trees on mine lands help stabilize soil, improve wildlife habitat and create timber resources. This 5-year-old bur oak planted on reclaimed abandoned mine lands in Bates Co. is already producing acorns.

gencies. An AML emergency is a sudden event related to past coal mining that has a high probability of causing substantial harm. There also must be a need to abate the emergency more quickly than would be possible under normal AML program operations. Sometimes an emergency complaint constitutes an eligible coal mine problem but the situation does not meet the emergency criteria. In this case, reclamation work could still be undertaken by the LRP under the normal AML program. The proposed reclamation project, however, would be subject to the project ranking and selection process

and would have to compete for available grant funds along with other Priority I and II problem sites.

Non-Coal Reclamation

Under SMCRA, state and tribal AML programs must give priority to reclamation of abandoned coal mines. However, Section 409 of the *Act* provides that, at the request of the governor of the state or the head of the tribal body, non-coal reclamation projects may be undertaken on a case-by-case basis before the priorities related to past coal mining have been fulfilled. Reclamation of such non-coal AML sites must be necessary for the protection of the public health, safety and general welfare from extreme danger, thereby meeting Priority I problem criteria. To date, LRP has not reclaimed any non-coal AML sites under Section 409 of the *Act*.

Section 411 of SMCRA also allows states and tribes that have certified that all coal reclamation has been completed to use their AML monies for non-coal reclamation. Presently, the states of Louisiana, Montana, Texas and Wyoming, and the Hopi and Navajo tribes have certified the completion of all coal reclamation projects. Missouri still has an estimated \$101.7 million of unfunded AML coal problems to reclaim before it may undertake non-coal AML reclamation projects under this provision of the *Act*.

Since fiscal year 1998, LRP has been involved in a joint project with the department's Hazardous Waste Program (HWP) to demonstrate reclamation techniques at abandoned lead/zinc sites in Jasper County. The HWP received grant funds from the U. S. Environmental Protection Agency to conduct the demonstration work and LRP has utilized the funds to complete construction activities. The LRP and HWP jointly completed the design work for the sites. LRP, utilizing local contractors, completed the earthmoving activities, soil amendments and temporary seeding on approximately 50 acres of mine tailings. Additionally, five dangerous mine shafts have been filled or sealed in Jasper County. Further seeding work on the sites is planned for 1999.



Environmental Indicator

Reclaiming Mined Land

Health, safety and environmental problems associated with mining include acid runoff, soil erosion, abandoned shafts and other unsafe conditions. The Missouri Department of Natural Resources is responsible for minimizing the environmental and health-related impact of mining activities. Of the 170,060 acres of Missouri land disturbed by mining activities, 51,360 acres have been reclaimed or will be reclaimed. Of the remaining 118,700 acres, 55,400 acres of abandoned coal mine lands will not be reclaimed because they are naturally stabilized and are not a threat to public health or the environment. The remaining 63,600 acres are metallic and industrial minerals sites that have no funding available for reclamation.

Missouri coal is surface-mined. Sites that were mined before laws were in place to protect the land were generally left as they were, with acid- and toxic-forming materials exposed. Today, mining companies are required to backfill the overburden into the pits and bury the acid- and toxic-forming materials and replace the topsoil. This restores the land to a productive use.

Industrial minerals are generally mined in a similar fashion. However, the amount of overburden is much less, and the mineral deposit is much thicker.

Metallic minerals are deep mined through elevator shafts constructed to the deposit. The ore is removed from the rock through a flotation process. The waste rock materials, called tailings, are sluiced to the huge ponds or piles. Before environmental protection laws were in place, tailing piles were simply left when the ore deposit was depleted. The mines filled with water and, in some cases, had open shafts exposed. The tailings were left to wind and water erosion, which resulted in serious air and water pollution problems.

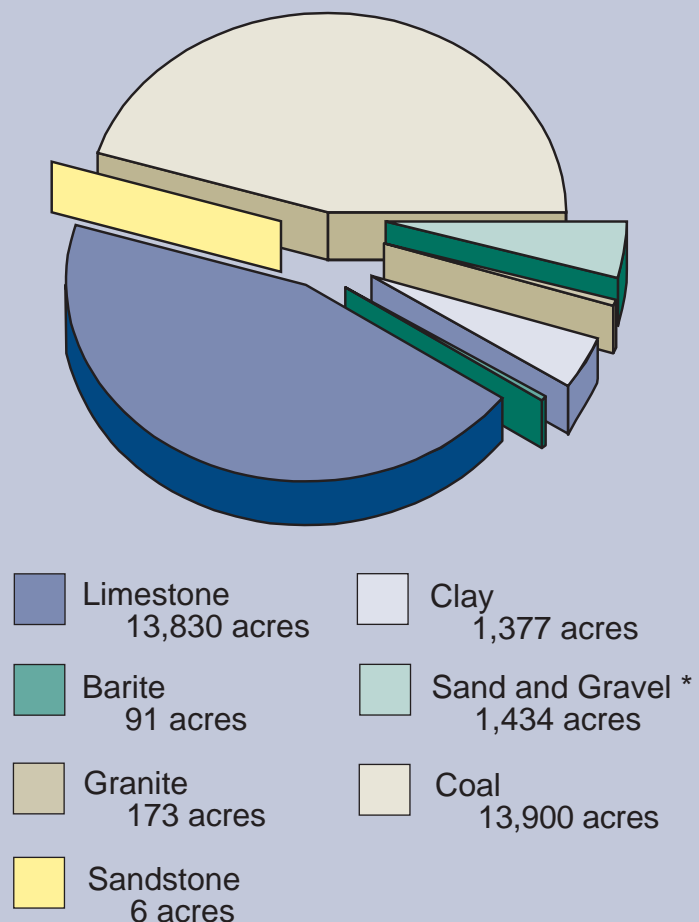
Today, all mining companies are required to provide financial assurance through reclamation

bonds. These bonds ensure that sites are properly graded, revegetated and maintained after mining ceases.

Challenges To Missouri's Land

Another challenge is reclamation of lands disturbed by mining and abandoned by the mining operators before environmental protection laws were passed. Only abandoned coal mine lands are eligible for federal Abandoned Mine Land cleanup funding, and these funds are very limited. Some abandoned lead- and zinc-mined lands may be eligible for cleanup under federal law. The other abandoned mine land sites, including lead, zinc, barite, limestone, clay, sand, gravel and some other commodities, will remain unreclaimed until funding is available. The U.S. Congress is considering changes to the 1872 Mining Law, which may begin to provide some limited funds for this purpose.

Total Acres of Land Reclaimed



Land Reclamation Information

Missouri AML Technical Assistance Bulletins - Landowner Management Guide for Minelands

1. Strip Pit Management and Neutralization
2. Cool-Season Grass Stand Management on Reclaimed Minelands
3. Warm-Season, Native Grasses on Reclaimed Minelands
4. Establishing and Managing Warm Season, Native Grasses on Reclaimed Minelands
5. Tree Planting on Missouri Minelands
6. Tree Species for Missouri Minelands

Also available:

Missouri Department of Natural Resources Abandoned Mineland informational flyer.

For further assistance or to obtain copies of these publications please contact the Abandoned Mine Land Section, Missouri Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102, (573) 751-4041.

Information on the Internet Missouri Department of Natural Resources

Land Reclamation Program
(<http://www.dnr.state.mo.us/deq/lrp>)

Technical Assistance Program
(<http://www.dnr.state.mo.us/deq/tap>)

General DNR Department Information
(<http://www.dnr.state.mo.us>)

The Complete Missouri Mining Law
(<http://www.moga.state.mo.us/statutes/c444.htm>)

U.S. Department of Interior Office of Surface Mining

Office of Surface Mining (OSM)(Washington D.C.)
(<http://www.osmre.gov/osm.htm>)

OSM - Mid-Continent Regional Coordinating Center (Alton, IL)
- (www.mcrcc.osmre.gov)

Other Mining and Reclamation Organizations

National Association of Abandoned Mine Land Programs
(<http://www.onenet.net/~naamlp/>)

Interstate Mining Compact Commission
(<http://www.imcc.isa.us>)

National Association of State Land Reclamationists
(<http://www.siu.edu/~coalctr/naslr.htm>)



Missouri Department of Natural Resources
Land Reclamation Program

P.O. Box 176

Jefferson City, MO 65102-0176

1 (800) 361-4827 or (573) 751-4041

